DOCUMENT RESUME

ED 172 136 CS 004 801

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TITLE Influencing Comprehension Development in Children.
PUB DATE Aug 78
NOTE 22p.; Paper presented at the Annual Meeting of the International Reading Association World Congress on Reading (7th, Hamburg, West Germany, August 1-3, 1978)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Cognitive Development; *Comprehension Development; Concept Formation; Educational Theories; Elementary Education; *Questioning Techniques; *Reading Comprehension; *Reading Instruction; Reading Processes; *Reading Research; *Reading Skills; Teaching Methods

ABSTRACT

The literature of reading theory and research suggests a number of key factors involved in the comprehension process. In simplest terms, comprehension is the process by which an individual actively generates meaning from some linguistic input. Five factors of reading comprehension have been identified through research: vocabulary knowledge, the ability to derive meaning from context, inferencing ability, the ability to deal with the structure of the passage, and the understanding of literary devices. A review of recent research supports the importance of all five factors to the reading comprehension process and also suggests the importance of using preexisting knowledge schemata and involvement in comprehending and retaining prose interpretations. The five comprehension factors can be enhanced in the classroom through the appropriate use of questioning strategies. Questions should be carefully designed to create sufficient internal disequilibrium to result in high internal motivation for the child. If this can be accomplished, the net effect will be increased concept development and the formulation of new inferencing strategies. (GT)

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International Reading Congress
hamburg, Germany
International Reading Association

Influencing Comprehension Development in Children

Foerderung des Sinnerfassungsvermoegens bei Kindern

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Thank you, Mrs. Hoffman, for that thoughtful introduction. I am most pleased to be with you here today and participate in the seventh World Reading Congress. The choice of theme "Reading" Liberator of Humankind" is to be commended. Certainly the goal of developing comprehension skills in children can contribute substantially to humankind's liberation.

I would like to introduce my comments here today with a quote from Lewis Carroll - a quote which provides a mental backdrop for the ideas which I would like to share with you.

Humpty Dumpty speaks, "There's glory for you!"

"I don't know what you mean by 'glory'", Alice said.

Humpty Dumpty smiled contemptuously. "Of course you don't -- till I tell you. I meant there's a nice knock-down argument for you!"

"But 'glory' doesn't mean 'a nice knock-down argument'", Alice objected.

"When I use a word," Humpty Dumpty said, in rather a scornful tone, "it

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means just what I choose it to mean -- neither more nor less."

"The question is", said Alice, "whether you can make words mean so many different things."

"The question is", said Humpty Dumpty, "which is to be the master -- that's all."

In a similar way, we might ask "How do we make words mean?" and that is really the focus of our discussion here today. On our safari during the next few minutes we will attempt to capture the Elusive Comprehension armed with our wisdom net and experience gun, using the ammunition of research literature knowledge. But where do we start?

As psycholinguist John Carroll has observed when we talk of comprehension, we are concerned with "the structure of the individual's knowledge ... not the 'structure of knowledge' in general. The latter may in fact have very limited psychological reality and fail to be isomorphic with the individual's cognitive structure. A critical capacity in the individual's knowledge structure is the "ability to understand language ... and through that ability to acquire new knowledge". (6, p. 1)

In simplest terms, comprehension is the process by which an individual generates meaning from some linguist input - in the case of reading, this is

obviously printed text. The reader from the perspective of this discussion must be an active participant in this process. The role of participant assumes that some purpose or motivation is clearly in mind as the printed text is approached. The reader must first extract semantic and syntactic cues from the text; second interpret the semantic and syntactic information in the context of ongoing discourse; and third construct meaning by fusing textual information and previous information from his or her highly individualized cognitive structure.

The phenomenon of comprehension occurs with split-second speed and is taken for granted by the adult reader or listener, with little consideration of the language and thought processing involved. Consider the following passage (29, p. 362) for example:

The Wuggen and the Tor

Onz upon a pime a Wuggen zonked into the grabbet. Ze was grolling for poft because ze was blongby.

Let me now ask: "Where did the Wuggen zonk?", or "What was he (she) grolling for?", or "Why was he (she) grolling for poft?" And your response would be _____

Continuing:

The Wuggen grolled and grolled until ze motted a Tor. Ze glind to the Tor,

"Ik am blongby and grolling for poft. Doyum noff mehre ik can gine some poft?"

And I now ask: "Who did he (she) mot?" "Did the Tor have any poft?"

And finally:.

"Kex," glind the Tor, "klom with ne Wuggen. Ik have lodz of poft in ni bove."

And my question: "Did the Tor help the Wuggen?", "What do you think happened next?" "What would you do if you were the Wuggen? Why?"

Obviously the major meaning clues of the passage reside in the relational or structural meaning. The early questions called for responses based directly on recall of story details derived from structural meaning clues. The last questions, however, required you as a listener to utilize information in the passage as you project your own meaning into the passage, manipulate this projected meaning and arrive at some inference or application.

Well in this introspective manner we seem to identify several levels of comprehension. But what does the research literature have to say about the components of comprehension and the process? A wide range of empirical studies provide information on comprehension levels and skill competencies. Lennon's summary (16) of approximately thirty studies reveals several components of reading comprehension:

First, a general verbal factor closely related to vocabulary knowledge.

Second, understanding of explicitly-stated materials, the understanding of literal meanings and the ability to follow directions.

Third, understanding of implicit or latent meanings, the ability to draw inferences, to predict outcomes, and to perceive a hierarchical arrangement of ideas within a selection labeled "reasoning in reading".

And fourth, appreciation of the work by "seeing the intent or purpose of an author, judging the mood or tone of a selection (and) perceiving the literary devices by means of which the author accomplishes his purposes".

One can also identify five distinct comprehension factors in the detailed factor analysis comprehension work of the late Fred Davis (10) using the criterion of unique variance. These factors are: One, knowledge of and recall of word meanings; two, drawing inferences about the meaning of a word from context; three, drawing inferences from the content; four, following the structure of the passage; and five, recognizing a writer's purpose, attitude, tone and mood.

It is striking to note the close parallel between the comprehension factors identified in the Lennon summary and those relatively independent factors in the Davis work.

... 1) Word meaning or vocabulary knowledge is basic to the comprehension process.

... 2) The ability to derive meaning from context whether explicit or in paraphrase is apparent.

... 3) Inferencing ability at the sentence and text level is present.

... 4) The ability to deal with the structure of the passage, and

... 5) understand the intent and the literary devices used by the author.

But do we find relatively recent evidence to support the psychological validity of these five areas? In responding to this question in our limited time period, I will first treat word meaning or vocabulary knowledge and derivation of meaning from context together, followed by research related to inference from context, using passage structure and devices used by the writer.

Children must develop extensive mental lexicons that efficiently and accurately represent knowledge of concepts. In addition, they must develop skills and strategies in order to apply both relational and conceptual knowledge about words to the reading task. Clark and Clark note that:

"Children use what they already know together with conceptual cues to form hypotheses about what new words might mean. From these hypotheses,

they derive strategies for producing and interpreting the words in other situations. Their initial hypotheses often overlap with the adult meaning, but their use is overextended or underextended compared to the adults ..... As children find out more about how each word is used, they refine their hypotheses and strategies until their meanings coincide with the adult ones." (8, p. 513)

Children's concepts develop along a continuum from a concrete, through a semi-abstract or functional, to an abstract level. (11, 31) Although most youngsters enter kindergarten and first grade with knowledge of many hundreds of words, knowledge of a given word may be limited to a very specific meaning. For example, in our language development study I asked a six-year-old "Why do you think a handkerchief is called a handkerchief?". She responded by saying "Why a handerchief is called a handerchief because you wipe your sneeze on it." - a truly functional response. As the child's lexical meaning store expands, specific meanings must be developed which are appropriate to a given context, and multiple meanings of specific words must be developed.

Arlin reports that in 80 percent of the readers studied access to word meaning was found to be a prerequisite to paragraph meaning. (2) The importance of word meaning to comprehension can also be seen from studies which show that

poor decoding skills prevent effective utilization of the mental lexicon, even where word knowledge is well developed. Ineffective decoding not only prevents retrieval of single word meanings, but also interferes with using semantic and syntactic information critical to textual comprehension. (14, 20, 24, 32)

Recent studies dealing with syntactic and semantic stragegies point to the importance of these factors in comprehension. Guthrie found, for example, that poor readers generally underutilized syntactic and semantic cues during reading when compared with good readers. (15) Both Lesgold (17) and Richek (26) concluded from studies of syntactic structures that syntactic constructions and their use depended to a great extent on both the semantic and contextual aspects of the sentence. Difficulty was attributed to all these factors, not just syntactic ones. Word order, pattern markers and punctuation were found by Neuwirth to be directly related to comprehension of printed material. (19) As Clark and Clark observe meaning is derived as constituents of surface structure are identified and propositions are developed using syntactic and semantic strategies. "As they (listener or reader) build each proposition, they add to it the interpretation they have formed of the sentence so far, and the propositions taken together constitute the finished interpretation." (8, p.85)

Clearly, this brief review consisting largely of recent research supports the view that vocabulary knowledge and the ability to derive information from context using syntactic and semantic strategies are both critical to the comprehension process.

Let us now turn briefly to the last three comprehension factors which were identified in the Lennon and Davis works -- inferencing ability, ability to deal with the structure of the passage, and devices used by the writer.

Just as word meaning and vocabulary knowledge contribute to deriving meaning from context, contextual meaning in sentences is considered an important factor in inferring text meaning. Garrod and Stanford's study of inter-sentence relations dealt with antecedent-anaphoric relations. (13) They concluded that this type of sentence inference information is processed as the sentence is interpreted using a procedure which identifies conceptual relationships during the time the sentence is being interpreted. In this way the reader appears to use a sort of mental checking and arrives at interpretation of the text directly.

Perfetti and Goldman (23) reported that topicalization in sentences provides a momentary focus for information currently being processed. At the text level an analogous referential focus is provided by thematization.

Inferencing appears to be a basic skill which plays a major role in extracting or constructing meaning from text and this ability appears to develop over time. Paris and Lindauer (21) and Paris and Upton (22) found that the ability to understand and remember inferences in prose improved with age for children in the six to twelve age range. This increased ability was not simply a result of improved memory span. Children in kindergarten through grade two did not use inferencing abilities to a great extent; however, their inferencing and general recall abilities were found to be enhanced by acting out situations based on the text. This developmental shift would appear to be closely related to stages of cognition development as children move from concrete to formal operations in a Piagetian sense. It is important to note, however, that inferencing does occur across the entire age range and is facilitated by concrete "acting out" experiences at the earliest levels.

Thorndyke investigated the relationship between inference use and comprehension recall. (37) His findings suggest that the generation of various inferences and the integration of inferences with known information allows the reader to identify a unifying context or interpretation "frame". This context or "frame" is then used to assist in the interpretation of the passage.

The findings of Brown and Smiley (5) lend support to Thorndike's conclusion. Children as young as third grade were found to use pre-existing knowledge schema to elaborate and embellish their retention of prose passages. In effect, the strategies of the children paralleled those of adults in that background knowledge was used to establish a context for a particular reading passage. Results of the study lead to the conclusion that recall of information is better if prior background knowledge is provided to children before reading the passage.

The work of McKoon (18) supports the notion that text is represented in memory by a hierarchical structure with topics prioritized over details. Evidence was also included to suggest that evaluation and integration of propositions into this hierarchy takes processing time for the individual. Information must be represented at a deeper level of processing than that for immediate verbatim recall. This conclusion adds emphasis to the contention that comprehension has multi-levels of meaning, some of which are more useful than others and serve different functions.

The way in which pre-existing knowledge and text information is used to arrive at an interpretation of text was studied by Frederiksen. (12) He examined the interaction of mental processes with text by repeatedly

exposing adult subjects to the same paragraph. He found that although subjects were very familiar with the actual content of the passage their inferences and overgeneralizations, which resulted from the interpretation process, became part of the semantic structure of that text in memory.

The recall and comprehension of text material seems to be improved if the cognitive interaction extended by the reader is heightened. Schumacher et al. (33) found that if subjects are not provided organizational structure such as paragraphs or advance organizers, they are forced to carry out activities to generate their own structures and this involvement in turn appears to improve comprehension. This conclusion is also supported by the research of Paris and Upton (22), Paris and Lindauer (21) and Thorndyke (37).

This brief review of current research supports the importance of inferencing ability at the sentence and text level, and the value of using the structure of the passage and structural devices in deriving meaning from text. The importance of using the individual's pre-existing knowledge schema and involvement in comprehending and retaining prose interpretations is also evident. Support for the psychological validity of specific factors in the comprehension process appears to be substantial.

Let us now assume at this point that the key comprehension factors discussed do possess psychological reality. We may then proceed to ask, can these factors be altered to influence comprehension development in children? Because of our time limitations I would like to approach this question from only one perspective. This limited aspect of instruction can, I believe, best be labeled "cognitive commerce", a term coined by the late Hilda Taba of San Francisco State University. (34, 35) "Cognitive commerce" refers to that intellectual transaction which occurs when the child is actively engaged with his or her environment. In this condition the child's thinking is focused and highly stimulated because of teacher or child questions.

The question thus becomes the basic instructional tool used to focus attention, aid in sorting relevant information, stimulate cognitive processing, and encourage optional problem solutions of a creative nature. Questions may range from a focusing type, which establish a "mental set" or purpose for reading or discussion, to a raising type, designed to obtain additional information on a topic at a higher level of comprehension. Questions can clarify information and encourage the child to involve higher thinking processes as the "why" of a process or phenomenon is considered. In brief, questions can make provision for a "guided-discovery" approach to instruction

by stimulating children to search for specific information clues, establish cause-and-effect relationships, and derive inferences. Skillful questioning strategies not only provide direct feedback to the child, indicating the appropriateness of response, but also provide direction for additional hypothesis building in the search for solutions. (29, p. 366)

The first two comprehension factors - vocabulary knowledge and deriving meaning from context - which we discussed can be greatly enhanced through questioning strategies, specifically by using questions in the development of the five language-influenced intellectual development sources identified by Bruner et al. (14)

1. Words, "invitations to form concepts" for the child who encounters unfamiliar labels and is curious about their meanings.

2. Dialogue between child and adult, a basic source of concept development and experience orientation.

3. School environment, which creates the need for a different functional variety and use of language.

4. Scientific concepts, which may be unique to a culture and conveyed verbally.

5. Conflict between modes of representation (action, imagery and language),

which may enhance intellectual development through contrast and abstraction of concepts. Appropriate questions can facilitate the child's intellectual growth as he or she interacts with his environment whether at home or at school.

Almy has expressed the view that teachers need to develop greater sensitivity to children's responses. (1) This sensitivity can be greatly heightened by understanding the developmental nature of children's cognitive growth. She also believes that teachers should ask questions that have no single correct answer and that provide insight into the nature of the child's concepts.

The third, fourth and fifth comprehension factors -- inferencing, ability to deal with the structure of the passage, and structural devices -- may also be enhanced by questions posed in the problem-solving setting designed to encourage the child to "search for the structure of the problem" and identify "relationships and patterns among ideas and facts". (7, 34, 35)

But is there evidence that such instructional procedures do have impact on comprehension development? The research by Taba et al (35, 36) demonstrated that through systematic instruction children can learn to make inferences, generalize and make logical assumptions.

The detailed study of Wolf, King and Huck on children's critical reading abilities identified the importance of higher-level questions on children's responses. (38) They found that questions they characterized as interpreting, analyzing, applying and evaluating produced higher response levels than did specific fact or classifying type questions. The research by Covington et al. (9) revealed that students in a general problem-solving program stressing "productive thinking" were more effective in using cognitive skills and strategies common to creative problem-solving. Such research supports the hypothesis that comprehension skills can indeed be influenced.

A brief comment is relevant here regarding the nature of the process by which questioning strategies may affect comprehension development. From a Piagetian viewpoint (2, 25), new information is accommodated through the following steps:

1. Encounter with new idea or information
2. Conflict with our own internal mental schemata
3. Disequilibrium - a sort of mental unbalancing
4. Search for insight and adjustment of our personal schemata to accommodate new ideas
5. Adjustment of old schemata to accommodate new ideas, and

6. Restoration of mental equilibrium and viewpoint (30)

Questions must be carefully designed to produce a sufficient degree of disequilibrium to affect high internal motivation in the individual. Should the question be too abstract in nature or too basic in nature the net effect will be confusion or boredom. In either case, the teacher will be ineffective because of the poor "fit" between the concept or inference pursued and the internal mental schemata of the child. The proper question "fit" will require detailed knowledge of the child and understanding of the comprehension objective in order to be effective. (28) As Ross and Killey found, fourth-grade children remembered answers to their own questions better than answers to a partner's questions. (27) This study supports the viewpoint that increased attention is created by self-motivation and questions which have good "fit" with the child's internal cognitive structures.

In conclusion, the comprehension process would appear to involve a number of key factors ranging from knowledge and recall of word meanings to identifying the structure of a passage. Questioning strategies offer one effective means of influencing children's comprehension development when used by the skillful teacher. This requires that the teacher design questions which have good "fit" between the concept or inference pursued and the child's

internal cognitive "schemata". A primary goal in question design is to create sufficient internal disequilibrium which will result in high internal motivation for the child. If this can be accomplished the child will be motivated to search for insight and adjust his or her personal schemata to accommodate new ideas and in turn restore mental equilibrium. The net effect will be increased concept development and the formulation of new inference strategies.

As we conclude our safari today we are clearly on the trail of the Elusive Comprehension, given the evidence presented. In all probability, however, our wisdom net, experience gun and ammunition of literature knowledge will require substantial refinement before the Elusive One is finally captured.

Thank you very much.

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